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**"Counterair C4I and the C4I for the Warrior Vision --A Dream Come True  
or The Impossible Dream?"**

by

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**This paper submitted to the Faculty of the Naval War College in partial  
satisfaction of the requirements of the Department of Joint Military  
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**The contents of this paper reflect my own personal views and are not  
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### Abstract of

#### **Counterair C4I and the C4I for the Warrior Vision--A Dream Come True or the Impossible Dream?**

Critical to the Joint Force Commander's (JFC) overall success in defeating the aircraft and missile threat is the requirement and prerequisite for air superiority and the successful counterair operations that achieve it. Undergirding all counterair operations are the bedrock C4I processes and capabilities that allow the JFC to see, plan, coordinate, control, and direct operations. To accomplish these tasks against increasingly more complex, and proliferating, aircraft and missile threats, the JFC has three critical C4I operations requirements that must be met. The JFC first requires processes and an organizational structure that results in unity of effort. Second, he/she requires three standardized information dissemination and decision support system nets. These are a joint planning net that uses non real-time information to accomplish planning tasks; a joint data net that uses near real-time information to perform battlespace awareness and battle management functions; and a joint composite tracking net that uses real-time sensor information to formulate accurate and time-critical fire control solutions. Finally, the JFC needs all information relating to counterair operations to be correlated, and/or fused. Meeting these requirements is essential to improving the JFC's ability to conduct counterair operations and move his/her counterair C4I efforts closer to fulfilling the DOD vision for all C4I, C4IFTW.

Attaining air superiority in the future will depend on our meeting these critical operational needs. The time is ripe to meet these requirements, so that the JFC will be ready to defeat the aircraft and missile threat of tomorrow and make C4IFTW a dream come true for the JFC in regard to theater counterair operations.

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## I. Introduction

*"The time is ripe to set a course to resolve our C4I interoperability issues." 1*

*- Colin Powell, June 1992*

**C + 15:** *Land, sea, and air forces are arriving daily at air bases and sea ports in the theater of operations as planned.*

**0130Z:** *The enemy begins to position aircraft and missile forces to launch a preemptive attack to defeat the staging coalition forces. Before the coalition's air defense forces and systems are in-place, enemy fighters and bombers, loaded with conventional bombs and cruise missiles, surge from various air bases and concentrate themselves at rendezvous points--as they have for the past several days. This time, however, they are about to begin a major two-phase attack. Phase I is to be a counterair attack to achieve uncontested air superiority; phase II is to be a follow-on air and land attack to decisively defeat the coalition's forces.*

**0210Z:** *Enemy ballistic missile transporter, erector, launchers (TEL) move from hide sites to launch sites preparing to join in Phase I's synchronized surprise effort. At the same time, surface-to-air missiles (SAM), and fighter aircraft armed with anti-radiation and air-to-air missiles, are launched against the coalition's U-2's, Unmanned Aerial Vehicles (UAV), ground radar sensors, Joint Surveillance Target Attack Radar System (JSTARS), E-2's, and Airborne Warning and Control System (AWACS) aircraft; hoping to begin the blinding of command, control, communications, computers, and intelligence (C4I) elements, and subsequently operational commanders. The enemy objective is to directly attack the coalition's operational center of gravity, its forces, before they, and their supporting logistics, are established and dispersed throughout the theater.*

*The coalition's problems have just begun. Increasing the difficulty of defending against the targeting of its theater sensors are command and control (C2) architecture and unity of effort problems inadvertently caused by the Joint Force Commander (JFC)/Combined Force Commander. Due to ambiguity in joint doctrine concerning the overlap and differences between counterair operations and theater missile defense (TMD) operations; and because of its failure to make organizational recommendations on how a JFC can best organize his/her forces to counter the total air threat, the JFC elected to place all TMD active defense and attack operations assets under the operational control of the Joint Force Land Component Commander, vice Joint Force Air Component Commander (JFACC), thus dividing historic counterair tasks and resources.*

*One minute after missile launch, an Air Force Control and Reporting Center (CRC) equipped with an expert missile tracker system detects the enemy SAMs', as well as the simultaneously attacking aircraft and cruise missiles. Immediately the CRC's weapons assignment officer transmits a commit message to an Army Patriot battery requesting them to engage two of the SAMs flying in close proximity to one another. After initially refusing to accept the weapons assignment request from the Air Force unit, the Patriot battery replies with a will comply message informing the CRC and other data link/net participants that they will engage the SAM—not SAMs. CRC crew members, however, can not comprehend this distinction. Due to equipment incompatibilities, CRC operations consoles show only one icon for tracks flying in close proximity to one another. Patriot display consoles show a separate icon for each track. Thus, the Patriot battery sees the engage request on only one of the two SAMs and fails to understand that the CRC wants it to engage both tracks. They engage one of the SAMs, but the other one gets through. Two minutes later, the AWACS and other net participants lose contact with the previously orbiting JSTARS aircraft. This is just the beginning. "Dis" unity of effort against the complete air threat and inadequate system interoperability, lead to the devastation of our forces.*

Potential enemies today are studying our doctrine and learning lessons from our military experiences. Although a risky engagement, the enemy, in this scenario, believed

that achieving air superiority was paramount to waging war at the operational level; also that our counterair C4I systems were potential vulnerabilities that could be exploited. They were, and are, right on both counts.

This scenario highlights the extreme importance of the JFC gaining and maintaining air superiority against the full spectrum of air threats. History instructs us that control of the air is not an end in itself, but rather, a prerequisite for other joint operations to be successful; including projecting United States (US) forces into a theater, providing continuous surveillance, interdicting enemy forces, and conducting strategic attack and surface maneuver.<sup>2</sup>

Critical to the JFC's overall success in defeating the aircraft and missile threat is the requirement and prerequisite for air superiority and the successful counterair operations that achieve it. Undergirding all counterair operations are the bedrock C4I processes and capabilities that allow the JFC to see, plan, coordinate, control, and direct operations. To accomplish these tasks against increasingly more complex, and proliferating, aircraft and missile threats, the JFC has three critical C4I operations requirements that must be met.<sup>3</sup> The JFC first requires processes and an organizational structure that results in unity of effort. Second, he/she requires three standardized information dissemination and decision support system nets. These are a joint planning net that uses non real-time information to accomplish planning tasks; a joint data net that uses near real-time information to perform battlespace awareness and battle management functions<sup>4</sup>; and a joint composite tracking net that uses real-time sensor information to formulate accurate and time-critical fire control solutions. Finally, the JFC needs all information relating to counterair operations to be correlated and/or fused. Meeting these requirements is essential to

improving the JFC's ability to conduct counterair operations and move his/her counterair C4I efforts closer to fulfilling the DOD objective for all C4I, C4I For the Warrior (C4IFTW).

## **II. Counterair Operations, C4I, and C4I For the Warrior (C4IFTW) Explanations**

**Counterair Operations:** In 1986, the Joint Chiefs of Staff, understanding the importance of attaining air superiority, published Joint Pub 3-01.2, *Theater Counterair Operations*. In it, they defined counterair operations as all measures, such as the use of SAM's, anti-air artillery (AAA), fighters, bombers, and electronic counter measures (ECM) to defeat the aircraft and missile threat, both before and after launch.

The objective of counterair operations (defensive and offensive) is to gain control of the air environment and protect friendly forces.<sup>5</sup> Once a potential adversary has succeeded in developing a theater air capability, military options begin with target surveillance and classification, intelligence preparation of the potential battlefield, and strike planning. Should the political decision be made to engage an adversary's theater air capability, or respond to a hostile act, the range of military options continues with offensive counterair (OCA) operations. This proactive phase of the military response employs high-payoff attacks directed against theater air targets throughout enemy territory as close to the source as possible.<sup>6</sup> This target set can consist of research and manufacturing facilities, key C4I centers, pre-deployment basing, missile launch sites, air bases, post-launch missile launch vehicles, missile hide sites, and dispersed operating bases. Once enemy theater air systems are launched, military operations enter a reactive mode and defensive counterair (DCA) tasks are conducted. DCA operations involve the engagement of aircraft, and the interception of missiles, in flight. Compared to offensive operations, engaging targets in flight is inherently more challenging and offers a much

lower payoff for each friendly aircraft sortie or surface missile launch.<sup>7</sup> Paramount to defeating the air threat and achieving air superiority are the C4I processes and systems that allow the JFC to lead both defensive and offensive counterair operations.

**Counterair C4I and C4IFTW:** Counterair operations are joint operations that are conducted primarily at the operational level of war. To be successful, their execution requires coordination of each service's forces, along with contributing theater and national assets. The JFC uses these counterair C4I processes to accomplish this coordination and plan, control, and direct operations. Associated C4I systems are the information exchange and decision support sub-systems accommodating these counterair command and control (C2) functions.<sup>8</sup> The C4IFTW vision is to guide all C4I operations.

The Joint Staff/ J-6 developed the C4IFTW vision in 1992 to focus all C4I on the theater commander's warriors--to include the theater commander himself. Its vision starts with the warriors' requirement for a fused, real-time true representation of the battlespace and provides a general roadmap to reach the objective of a seamless, secure, interoperable global C4I network. Its vision is to make the operational commander's job easier by providing him or her, and each subordinate with "a fused, real-time, true representation of that warrior's battle space--an ability to order, respond, and coordinate horizontally and vertically to the degree necessary to prosecute his/her mission in that battlespace."<sup>9</sup> The goal of C4IFTW then is to provide an interoperable, fully integrated C4I system for combatants to assess, respond, lead, and fight with maximum effectiveness, on arrival, and in unison with any other element.<sup>10</sup> This vision will be complete when the entire Joint Task Force (JTF), and all of its components, are functionally integrated and interoperable.<sup>11</sup> To accomplish this, C4IFTW sets forth a concept of guiding principles and

provides a roadmap to make its vision a reality. By design, its aim is to ultimately bring the warrior an accurate and complete picture of the battlespace, timely and detailed mission objectives, and the clearest view of each warrior's targets. Building on joint doctrine and with a roadmap pointed toward joint interoperability, C4IFTW's importance to the efficiency of counterair C4I cannot be overstated. The C4IFTW vision guides C4I operational processes and has illuminated/revealed previously unstated counterair C4I operations requirements.

### **III. Requirement #1: Unity of Effort**

The JFC's most important counterair C4I operational requirement is a process and organizational structure that results in unity of effort. The C4IFTW vision and accompanying roadmap quotes Joint Pub 1, restating that "joint doctrine offers a common perspective from which to plan and operate, and fundamentally shape the way we think about and train for war."<sup>12</sup> Conversely, in the area of counterair operations, joint doctrine can be confusing and understood in such a way as to "dis" unify counterair efforts. Although it clearly subordinates counterair operations under the JFC to ensure unity of command, it is vague and fails to offer specific organizational recommendations that would allow the JFC to optimize unity of effort in countering the aircraft and missile threat. Moreover, it does not differentiate or explain the relationship between theater missile defense (TMD) and other counterair tasks. This omission could easily lead a responsible commander to "dis" unite the counterair/TMD effort with potentially devastating effects to his/her forces.

In defining unity of command, Joint Pub 3-0 states, "The purpose of unity of command is to ensure unity of effort under one responsible commander for every objective."<sup>13</sup> Because all components and allied forces possess some capability to counter the aircraft and missile threat,

the JFC is faced with the dilemma of how best to organize to integrate their potential contributions. Does he/she separate the ballistic missile threat from other air threats (aircraft, UAV's, and cruise missiles), and subordinate C2 of their destruction to the component commander with the most active defense assets for theater ballistic missile (TBM) defense only--as some contend joint doctrine instructs? Or does he/she understand the ballistic missile threat as one of several threats that will be employed against our forces and assign C2 of their destruction to the component commander with the strongest capability to control and defeat the total air threat? More succinctly, does he/she break TMD active defense and attack operations tasks away from other counterair operations and assign the destruction of cruise and ballistic missiles to a separate component commander; or does he/she ensure unity of effort by assigning their destruction to a single commander--the one with the strongest C4I capabilities and preponderance of total counterair assets? Current joint doctrine states that JFC's will normally designate the JFACC to plan, coordinate, allocate, and task counterair operations and assets.<sup>14</sup> This includes command authority for all joint operations to defeat the aircraft and SAM threat, based on JFC guidance. Conversely, for operations against cruise and ballistic missiles, joint doctrine is unclear. Joint Pub 3-01.5, *Doctrine for Joint TMD*, can be understood to sanction dividing this responsibility among more than one component commander.<sup>15</sup> To be most effective, however, counterair operations should be controlled by only one individual, the Joint Force Air Component Commander.<sup>16</sup> Counterair tasks and assets should not be divided.

There are several advantages to fully integrating counter TBM and cruise missile efforts with overall counterair operations. First the JFC needs to ensure forces and vital interests are free from air attack. Today in an age when all the delivery vehicles are becoming more accurate,

lethal, and potentially armed with weapons of mass destruction (WMD), successfully defeating only part of the air threat is inadequate. Also, in today's world, all of these air threats are able, and probably will be used in simultaneous attacks against our forces. Second, all systems with an aircraft defense capability also have capabilities against missiles. Marine Hawks, Army Patriots, and Navy Aegis Destroyers and Cruisers can, or will soon be able to, counter aircraft, cruise missiles, and ballistic missiles; while Air Force, Navy, and Marine fighters can engage aircraft and cruise missiles. A single commander can more optimally capitalize on the strengths of all these defensive weapons systems to compensate for the weakness of the individual systems. Third, by subordinating all offensive operations under a single commander, the JFC can prioritize targets to cover weaknesses in the defense and vice-versa. Fourth, the operational capability against aircraft often overlaps our capability against cruise missiles. For surveillance and weapon system operators, a cruise missile radar track will appear identical to an aircraft radar track. They have the same flight profile, airspeed, and altitude. This normally means that rules of engagement, combat identification, and weapons control measures will be similar, if not identical, for defense against enemy airplanes and cruise missiles. Finally, the overlaps and voids in engagement capability between surface-based systems and fighters must be managed to optimize overall system capability . For example, surface based systems engaging TBM's at high altitude can be supplemented by fighters to engage low-altitude cruise missile and aircraft threats. This level of teamwork, however, requires clear C2 authority.<sup>17</sup>

The importance of unity of effort in countering the aircraft and missile threat is reinforced by our experiences in WW II and Operation Desert Storm. Lessons learned during those conflicts, reinforce the requirement for unity of effort.

During the latter part of WW II, in the European Theater of Operations, the Allies had three air commanders, all with different concepts for the employment of airpower to achieve allied objectives. General Spaatz, Commander of US Strategic Air Forces, believed the German Luftwaffe should be defeated prior to the Normandy invasion. He wanted to strike German aircraft and oil industries, while simultaneously attacking the Luftwaffe.<sup>18</sup> On the other hand, Air Chief Marshall Harris, Commander of the RAF Bomber Command, believed that strategic bombing alone, targeted against the will of the people, would defeat the Germans. He felt that the Luftwaffe should be avoided. The third principal air commander, Air Marshall Leigh-Mallory, was responsible for US and British tactical forces dedicated to support the land invasion.<sup>19</sup> He believed that the Allies should gain air superiority by waiting to fight off the Luftwaffe over the beaches of Normandy, during the upcoming invasion. The result of this division in focus and effort was that in 1943 strategic bombing losses became prohibitive, and the Allies could not establish air superiority. It wasn't until General Spaatz successfully won the support of the theater's Deputy Supreme Commander in uniting the air effort and making counterair operations "the" priority that things began to change. This, and the input of overwhelming numbers of aircraft by the US into the theater, combined to turn things around for the Allies' Air Forces. As a result, in 1944, an unrecoverable pilot attrition rate was imposed on the Luftwaffe, in excess of twenty-percent per month, and Allied bomber survivability was greatly increased.<sup>20</sup>

Although the Allied team was able to overcome command "dis" unity of effort against the manned aircraft threat, they were not as fortunate with regard to Operation Crossbow--the allied effort to counter the German V-1 cruise missile and V-2 ballistic missile. In this operation, unity

of effort was again non-existent as a “Crossbow committee” directed both operational and intelligence efforts. Historians point out that committee directives were inconsistent; that the committee delayed critical decisions on which targets to strike and what weapons they should use; and they ignored analysis indicating the type of weaponry to use. Overall the Crossbow Committee proved to be a poor vehicle for guiding military operations against the V-weapons. The results of “ruling by committee” in this operation are now painful lessons-learned. In the end, the Allies suffered 32,000 military and civilian casualties to the V-weapons.

In summary, the Allies achieved success against the manned aircraft, largely because General Spaatz was able through persistence to compel and gain support for allied unity of effort against the Luftwaffe. Operations against the V-1 and V-2 lacked unity of effort and failed to neutralize the threat.<sup>21</sup> In Operation Desert Storm we did things differently.

We launched Operation Desert Storm with the distinct advantage of unity of command for air operations under a single component commander, and with a clear strategy that denied sanctuary to the enemy. All components of the Iraqi Air Force, ground based air defense system, and supporting C4I systems were attacked simultaneously the first night of the campaign. This included synchronized attacks on early warning sites and command nodes by Army attack helicopters and Navy Tactical Land Attack Missiles (TLAM). These missions were planned by service experts at the JFACC’s joint air operations center in Riyadh and disseminated on the air tasking order. Air supremacy was achieved in short order. Throughout the campaign, unity of effort for air operations led to a well-coordinated offense and defense that included assets from all the services and the coalition.<sup>22</sup> Unlike our experiences in WW II, unity of effort was possessed from the beginning.

#### **IV. Requirement #2: Standardized/Netted Information and Decision Support Systems**

*“...when you know sky and earth, victory is inexhaustible.”<sup>23</sup>*

The JFC’s second most important C4I operations requirement is for three standardized information dissemination and decision support system nets; specifically a joint planning net that uses non real-time information, a joint data net that uses near real-time information, and a joint composite tracking net that uses real-time information. The C4IFTW vision is for “each warrior and operational commander to respond and coordinate horizontally and vertically to prosecute effectively and successfully any mission in the battlespace.”<sup>24</sup> To make this vision a reality for counterair operations, the JFC requires three standardized types of informational nets; one whose information is based on non-real time information for planning tasks--a joint planning net; one whose information is based on near-real time information for battlespace awareness and battle management tasks--a joint data net; and one that is based on real time information to formulate accurate and time critical fire control solutions--a joint composite tracking net.<sup>25</sup>

**Joint Planning Net:** To produce timely and effective counterair employment plans, interoperable automated planning tools that use shared or distributed information are required at all levels. Commanders responsible for counterair tasks require a joint planning tool to fuse joint weapon system performance parameters and employment procedures with knowledge of enemy aircraft and missiles’ capabilities and intentions. These planning tools must be capable of incorporating large quantities of data about enemy terrain, national infrastructure, C4I systems, enemy orders of battle, CONOPS, and postulated military objectives. After all this data is entered, planning tools must be able to estimate the effectiveness of the counterair plans through imbedded simulation programs. By running various alternative counterair plans against worst case enemy

scenarios, planners can devise the most effective and efficient plans. Planning tools can then be used to translate the overall design into individual mission assignment for all counterair forces.<sup>26</sup>

**Joint Data Net (JDN):** Within the theater, a requirement also exists for a single JDN that can share data related to aircraft and missiles at an exchange rate capable of displaying all theater aircraft and missiles in-flight, in near real-time. This would be used in support of both (offensive and defensive) aircraft and missile battles. This network would use individual unit processors to convert organic sensor information into standardized data and symbology. This standard data would then be transmitted among participants to create a consistent picture of the battlespace.

This exchange of track data among units separated over a large geographic area would provide the ability to comprehend the battle situation beyond the sensor range of individual participants.<sup>27</sup> The benefits of such a single system, or net, are many. In the context of counterair operations, the most important benefits are giving all defensive counterair theater and tactical commanders a consistent tactical picture, enhancing the theater's organic radar acquisition capabilities by providing a means of cueing net units of approaching aircraft and missile threats, and providing theater commanders with own force status for decision making during hostilities.

**Joint Composite Tracking Net (JCTN):** As stated previously, the JDN establishes and maintains a theater-wide consistent tactical picture by exchanging track information over a single net. Emerging technology, however, enables systems to go beyond this and exchange precision sensor measurement data at the rate this data is measured by the sensors--in real-time. The following are some potential weapon system benefits that could be obtained from providing a JFC a JCTN. First, the JFC could maintain a composite track using the best sensor data from a myriad of sensors making combat identification of individual air targets easier. Second, JTF

units could engage aircraft on remote data if the situation warranted, thus allowing the warfighter to place ordnance on target earlier than if he is limited to engaging only what is acquired by an organic sensor. This would be particularly important when conducting cruise missile defense (CMD) operations. Third, JTF units could remain emission control (EMCON) silent and still conduct viable engagements. Fourth, a JCTN would enhance our ability to cue other organic sensors. Fifth, a JCTN could conduct engagements even if the organic sensor was being jammed. Finally, a JCTN could aid battlespace deconfliction by coordinating fires among adjacent weapons systems over shared defended areas much more smoothly.<sup>28</sup> The JFC has a desperate need for these three joint nets for planning, coordinating, controlling, and directing his/her counterair operations.

## **V. Requirement #3: Correlated or Fused Information**

*"From Plato to NATO, the history of command in war consists essentially of an endless quest for certainty."*<sup>29</sup>

Associated with the requirement for the three standardized nets mentioned above is the JFC's third most critical counterair C4I operations requirement. This is the requirement for correlated and fused information to minimize information overload to the user and to provide the user, on the three nets and elsewhere, with consistent and true information.

The C4IFTW vision identifies the requirement for correlated and fused information, however, it is not addressed as a goal, or operational requirement until the final phase of the C4IFTW roadmap. This is not soon enough. General Colin Powell, realizing the importance of fusion and correlation to the warfighter, insisted as far back as 1992 that "...information must be fused and distributed in such a way that it can be pulled from the global infosphere on

demand.”<sup>30</sup> His successor, General Shalikashvili also described this goal of producing a global C4I system capable of generating and delivering the fused information needed. However, precisely how and when the data in the global networks will be fused, and to what standards, is left unspecified.<sup>31</sup>

Correlation is an automated process that compares information from two or more sources and determines from these sources which information is the same.<sup>32</sup> For the Joint Data Net, or for Joint Data Net(s) to work optimally, an automated correlation process is critical. Taking correlation a step closer toward understanding specific truth about the theater is fusion. Fusion is the process of receiving and integrating all-source, multimedia, and multiformat information. It produces and makes available an accurate, complete summary of information.<sup>33</sup> As is obvious, this summary is more timely, concise, less redundant, and more useful to the warrior than if the same information were received directly from separate multiple sources. Use of fused information and data would minimize, and could potentially eliminate, inundation of the user with information from multiple sources and allow the user to pull required information when it is needed. In effect, in reference to fusion, the JFC, and all of his/her subordinate warriors, would request the fused information from a global distributed data base(s) that the C4I/FTW vision refers to as an “infosphere.”

The infosphere, or this global distributed data base(s), contains the total combination of information sources, fusion centers, and distribution systems that represent the C4I resources a warfighter needs to pursue his operational objectives.<sup>34</sup> The warrior essentially plugs into the infosphere and pulls out the required information when needed providing him/her with timely and relevant information. This process would work by a request for information going out to any

and all of the distributed sources within the infosphere to acquire information related to the request. To a great degree we can do this today, however, that information must then be condensed/fused into a single update to the warrior and give him/her only the information required, in the format required, with little or no need for human evaluation, and with no confusion caused by conflicting information from multiple sources. We can not do this today, but we desperately need to.

In summary, fused information would be extremely relevant to users of a Joint Planning Net and Joint Composite Tracking Net because it would allow the users to make decisions in regard to both operations-level plans and tactical firing engagements from all that is known about each aspect of these tasks. On the other hand, correlated information is critical to the optimal use of a Joint Data Net because it would prevent the user from being overloaded with extraneous data and provide him/her only the best information on any aircraft or missile track on the data net.

Although there are various planning tools in existence today, there is no joint planning net as described herein. Also there is no Joint Composite Tracking Net. Conversely, we do operate various joint data nets today, however, not with the automated correlation capability that is required. In these joint data net operations today, each net unit/element, for example an AWACS, E-2 aircraft, or CRC, must correlate each track in the system manually. For instance, during Roving Sands 95, last year's premier air defense exercise, there were multiple Air Force, Army, and Marine Corps radar sensors all surveilling the same airspace. To the uninformed this would appear to have given the JFC a very comprehensive air picture maximizing and building-on the unique strengths of each of his sensors. Unfortunately, because we do not have an automated correlation capability, this was not the case at all. What really happened was that the

data net was saturated with tracks and incomprehensible in and of itself. To fix/clean up the data net and its air picture, the net manager divided up the airspace into sections (called track production areas (TPA)). A TPA was given to the individual sensor/s that, the net manager felt, would present the best air picture. Everyone else was directed to put filters into their system's equipment to block information from going into the net. This was the only way to keep the net from being overloaded with multiple track reports, and it is the way we have been doing track correlation since the 1960s. So what the JFC has today is not multi-sensor surveillance; rather it is a patchwork of individual sensors' information pieced together to make an air picture. Against the aircraft threat of yesterday this may have been adequate. Against the total aircraft and theater cruise and ballistic missile threats of today, this way of doing business is totally inadequate. The JFC has a tremendous counterair C4I operations requirement for information correlation and fusion.

## **VI. Conclusion**

Effective C4I is critical to defeating the air threat now and will be even more so in the future. Since World War II, the air threat to the US and its allies has evolved and come full circle. Where civilian populations and military forces were once threatened by an array of then recently developed airborne systems that included the first generations of long-range aircraft and ballistic and cruise missiles, the air threat to today's US and coalition forces is both technologically advanced and increasingly diverse. Though the pace of aircraft and missile technology was steady throughout the Cold War, effective counters were primarily developed only for aircraft. During this period, the presumption that Soviet ballistic and cruise missiles would carry either nuclear or chemical warheads was a disincentive to the development of

effective counters as military and policy planners relied on the deterrent effect of retaliation and escalation.<sup>35</sup> Building on this presumption also had still another detrimental effect as cornerstone counterair C4I operational requirements were esteemed to be either too hard to do, unaffordable, or just were not articulated. In 1992, however, the joint community was awoken from its slumber with the Joint Staff/J-6's vision and roadmap for C4I, C4IFTW. Understanding the importance of this operations function, it proclaimed C4I's criticality and focused the DOD toward making C4I processes and systems more efficient. With this new focus also came the recognition that we could no longer delay meeting these pressing JFC operations requirements.

The JFC's most pressing counterair C4I operations requirement is for a process and organizational structure that results in unity of effort. To meet this need the joint community must begin to analyze the various organizational possibilities and re-write joint doctrine to include the results and lessons learned. We must not sacrifice unity of effort by not organizing ourselves in the most optimum way to accomplish the counterair mission. We must also meet the JFC's requirement for standardized information dissemination and decision support system nets that will allow him to better see, plan, coordinate, control, and direct all counterair operations. Finally, it is critical that we ensure that all the JFC's information related to counterair tasks and operations is correlated and/or fused. Attaining air superiority in the future will depend on our meeting these critical operational needs. The time is ripe to meet these requirements, so that the JFC will be ready to defeat the aircraft and missile threat of tomorrow and make C4IFTW a dream come true in regard to theater counterair operations.

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3. This author has worked in counterair C4I operations for the last 16 years. In my last assignment, I was the Deputy Director of the DOD's Executive Agency for Theater Air Defense Battle Management-Command, Control, Communications, Computers, and Intelligence (BMC4I) and responsible for orchestrating the development of the DOD's counterair C4I architecture accommodating all counterair, TAD, and TMD operations. It is from these experiences that I understand and present the JFC's three most important counterair C4I operations requirements.
4. The counterair, to include TMD and Theater Air Defense, C4I community has used near-real time data nets for over thirty-years. These nets/links, however, pass data at various speeds and have different capacity levels and capabilities. Most system standards and protocols for these data links were developed in the 60's, 70's, and 80's, for instance, Tactical Digital Information Link (TADIL) A, B, C, Army Tactical Data Link 1 (ATDL-1), and Patriot Air Defense Information Language (PADIL). This proliferation of data links hindered joint warfighting. In spite of this, however, the Services continued to field systems that only they could transfer data to and from. This proliferation of stovepiped nets necessitating the JFC to have to deploy various buffer/translator devices to assigned units to accommodate data transfer and provide his/her units a theater-wide "similar" view of the battlespace. On October 18, 1994, recognizing this proliferation problem, the Assistant Secretary of Defense for C3I, Mr Emmitt Page, designated LINK-16/TADIL J as the DOD's primary data link. He stated that all processed information would be disseminated through LINK-16 to permit standardized, interoperable, data link support directly to the operator on the battlefield. Due to cost, however, we can't just throw away these stovepiped systems and start over. Moreover, many of these systems are proprietary; thus altering them is cost prohibitive. Still further, many of our potential allies only operate with these other systems and data link capabilities. For all of these reasons, for many years to come, the joint C4I community will continue to have several joint data nets. This, however, does not negate the JFC's need for just one.
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